Intermediate Microeconomic Theory
ECN 100B, Fall 2019
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Final Exam Study Guide: Key Concepts and Techniques

To help you study effectively for the final, here is a list of some of the key concepts you've learned this quarter, with an emphasis on practical procedures you should be comfortable performing. This list is not meant to be exhaustive: except where I've indicated otherwise, anything we've covered in lecture, section, or the homework is "fair game" for the final.

Part 1: monopoly, price discrimination, and factor markets

Note: although monopoly was the first "new" unit we covered this quarter, you should also be ready to answer questions about perfectly competitive markets—solving for the equilibrium price/quantity, calculating consumer and producer surplus, etc.

Monopoly (with uniform pricing)

- Understand the causes of monopoly and the ways we can avoid or regulate them.
- Write down the profit function for a uniformly pricing monopolist.
- Calculate marginal revenue and find the quantity (or price) that maximizes total revenue.
- Understand what the two components of marginal revenue ($p(Q)$ and $p'(Q)Q$) represent.
- Be comfortable inverting the demand curve (switching from $p(Q)$ to $Q(p)$ or vice versa).
- Calculate the price elasticity of demand for a given demand curve.
- Understand the concepts of perfectly elastic, perfectly inelastic, and unit elastic demand.
- Solve for the equilibrium quantity and price under perfect competition.
- Solve for the equilibrium quantity and price under monopoly.
- Analyze a monopolist's entry/shutdown decision when there's a fixed cost of production.
- Construct and interpret a carefully labeled graph to represent the monopoly problem.
- Identify the consumer surplus, producer surplus, tax revenue (if any), and deadweight loss on a graph, and compute the numeric value of each term (as well as the total surplus).
- Analyze the effects of a specific tax imposed on either consumers or producers.
- Understand the difference between the *statutory incidence* of a tax ("who writes the check") and the *economic incidence* of a tax ("who really pays").

Price discrimination

- Understand the terms *personalized pricing* and *group pricing* (we skipped nonlinear pricing).
- Understand the conditions under which a firm can engage in perfect price discrimination .
- Understand the conditions under which a firm can engage in group price discrimination.
- Determine the quantity sold, revenue raised, and profit made by a perfect price discriminator.
- Determine the optimal quantities/prices under group price discrimination (with two groups).

- Know how to recognize and deal with a corner solution when a firm is selling to two groups.
- Understand the relationship between a group's price-sensitivity and the price it is charged.

Factor markets

- Understand the difference between product markets and factor markets.
- Understand the difference between short-run and long-run factor demands.
- Compute the marginal physical and revenue products of labor.
- Solve for a wage-taking firm's optimal short-run choice of labor.
- Solve for a cost-minimizing firm's choices of labor and capital when $q(L, K)$ is
    - linear (labor and capital are perfect substitutes).
    - Leontief (labor and capital are perfect complements).
    - Cobb-Douglas (an in-between case: neither perfect substitutes nor perfect complements).
- Understand the scale and substitution effects.

Part 2: game theory and oligopoly

Game theory

- Know how to read a payoff matrix (the players, strategies, and payoffs).
- Identify strictly or weakly dominant strategies, if any.
- Identify a player's best response(s) to an action chosen by the other player.
- Identify dominant strategy solutions and pure strategy Nash equilibria when they exist.
- Recognize when no pure strategy Nash equilibrium exists.
- Compute a player's expected payoff when the other player is using a given mixed strategy.
- Determine whether a given pair of mixed strategies is a mixed strategy Nash equilibrium (and if not, which player would want to deviate).
- Know how to read a game tree (the players, strategies, payoffs, and order of moves).
- Know how to draw a game tree, given a payoff matrix and the order of moves.
- Use backward induction to find the subgame perfect Nash equilibrium in a dynamic game. Know how to describe each player's complete "battle plan".
- Determine whether or not a given action would be a credible choice for a given player.
- Assess whether a given pair of strategies form a Nash equilibrium (and, if so, whether this Nash equilibrium is subgame perfect).

Oligopoly

- Understand the difference between Cournot duopoly and Stackelberg duopoly.
- Express each firm's profits as a function of both quantites chosen (q_1 and q_2).
- Derive each firm's best-response function.
- Recognize when you can/can't use symmetry as a shortcut. (I won't test you on this directly, but knowing when you can take advantage of symmetry may save you time.)
- Solve for the Nash equilibrium quantities/prices under Cournot or Stackelberg duopoly.
- Analyze total surplus in a duopoly model (consumer surplus, producer surplus, DWL, etc.).

Part 3: externalities, public goods, uncertainty, information

Externalities

- Calculate the competitive vs. socially optimal quantities in the presence of an externality.
- Calculate total surplus in the presence of an externality.
- Calculate the deadweight loss from an externality in the absence of regulation.
- Construct and interpret a carefully labeled graph to analyze a market with an externality.
- Analyze the effects of a corrective (Pigouvian) tax, and identify the socially optimal tax.

Public goods

- Understand the notions of (non-)rivalry and (non-)excludability.
- Give examples of private, public, club, and common goods.
- Construct the social marginal benefit curve for a market with a public good.
- Calculate the socially optimal amount of the public good that should be supplied.
- Calculate how much of the public good each agent chooses to produce in a Nash equilibrium.
- Understand the idea of the free-rider problem.
- Construct and interpret a graph representing a public goods problem with two players.

Uncertainty and information

Note: I won't ask any questions about the "risk premium". Also, in previous years I taught a final lecture on "asymmetric information" (adverse selection and moral hazard), and questions about these concepts appear on the Fall 2018 final exam. However, we did not have time to cover asymmetric information this year, so you will not be tested on these concepts on the final exam. (I will post some optional notes on adverse selection and moral hazard for anyone who is interested.)

- Calculate the expected value and variance of an asset.
- Calculate the expected value and variance of a stock portfolio when the stocks are perfectly positively correlated, perfectly negatively correlated, or uncorrelated.
- Understand risk averse, risk neutral, and risk loving preferences.
- Understand the idea of a fair bet, and how different agents feel about a fair bet.
- Calculate an agent's certainty equivalent for a given lottery or gamble.
- Understand strategies for reducing risk (e.g., avoidance, diversification, and insurance).
- Use an indifference condition to calculate someone's willingness to pay to avoid risk.
- Understand when diversification reduces risk, and when it doesn't.
- Calculate the actuarially fair price of an insurance contract
- Determine whether an agent wants to buy insurance at a given price (premium).